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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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Federal Communications Commission
Office of the Secretary

In the Matter of

Advanced Television Systems and Their Impact on the Existing Television Broadcast Service	)	
Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations	)	MM Docket No. 87-268
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	)	

TO: The Commission

COMMENTS OF FUTURE IMAGES TODAY

Respectfully submitted,

FUTURE IMAGES TODAY

By Raymond A. Kowalski

Raymond A. Kowalski,
Its Counsel

Keller and Heckman
1001 G Street, N.W.
Suite 500 West
Washington, D.C. 20001
(202) 434-4230

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EXECUTIVE SUMMARY

Future Images Today (FIT) is a proponent of a patented[1] advanced television (ATV) transmission system that enables broadcasting of high definition images within a 6 MHz spectrum channel allotment. In one of several possible configurations, the system can transmit 1050-line, non-compressed television signals that are compatible with existing home TV receivers. The FIT system was characterized as both unique and intriguing by the Chairman of the Advisory Committee, but the system was not mentioned in the Committee's Third Interim Report issued three months later to the Commission. Although the FIT system can support a variety of ATV baseband signals, it is being excluded from consideration by the Commission. FIT requests that the Commission order testing of its system. FIT also submits that ATV broadcast compatibility with existing home TV receivers is required under the law. All-Channel Receiver Act, 47 U.S.C. § 303(s). Typical television viewer reaction to the displays of the various ATV systems now under consideration is an essential part of the system selection process.

[1] U.S. Patent 5,067,017. Other patents pending.

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COMMENTS OF FUTURE IMAGES TODAY

Future Images Today, through its counsel and pursuant to Section 1.415(a) of the FCC's Rules, submits the following comments with exhibits in the above-captioned proceeding and in response to the Second Report and Order/Further Notice of Proposed Rule Making released May 8, 1992 (Order/FNPRM).

I. Interest of FIT in This Proceeding

1. Future Images Today (FIT) is a proponent of an advanced television (ATV) terrestrial transmission system (the FIT system) that enables broadcasting of high definition images within a 6 MHz spectrum channel allotment. In one of several possible configurations, the system can transmit 1050-line, non-compressed television signals that are compatible with existing home TV receivers.

2. The FIT system is also capable of being incorporated in and enhancing the performance of other currently proposed all digital ATV systems.[2] In order to maintain a 6 MHz baseband signal, DATV systems currently use image compression techniques and thus compromise picture quality when televised images move or scenes change. All proposed ATV systems need to

[2] ATV systems that transmit images entirely in the form of digital data. Referred to hereafter as DATV systems.

satisfy a 6 MHz spectrum bandwidth limit for their ATV signals pursuant to the Commission's First Report and Order of September 21, 1990.[3]

3. The FIT system was conceived and developed by an FCC licensed Amateur Extra Class Radio Operator. Over-the-air transmission experiments with the FIT system are being carried out in the 70 cm (UHF) amateur radio band as authorized under 47 C.F.R. § 97.305(c).[4]

4. The FIT system embodies the concept of orthogonality in wave polarizations, a viable concept that has already been adopted for downlink transponders in the satellite TV service[5]. There, 24 channels each with a 36 MHz wide active video bandwidth (a total active video bandwidth of 864 MHz) are

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[3] FIT is not a member of any "analog consumer electronics club" and its patented transmission systems can support a variety of video modulation techniques, including DATV. See remarks of Alfred C. Sikes, FCC Chairman, before the MIT Media Lab Symposium on Digital Television (May 21, 1992), at page 6. The FIT system incorporates digital signal processing both at the transmitter and receiver even when the radiated carrier wave is modulated by an analog video signal as in the current NTSC standard.

[4] The Commission established the amateur radio service for the purpose of continuing and extending "the amateur's proven ability to contribute to the advancement of the radio art." 47 C.F.R. § 97.1(b). The FIT system evolved because of the freedom allowed by the Commission for licensed operators to experiment with specialized communications systems including image type emissions. FIT encourages the Commission to continue to allow suitably licensed operators wide latitude in experimenting with specialized communications techniques.

[5] J.E. Traister, Guide to Satellite Television Installation, Prentice-Hall (1987), at 2-4.

contained within a 500 MHz wide spectrum band by assigning mutually orthogonal polarizations to consecutive overlapping channels.[6]

5. In one possible configuration the FIT system will support, simultaneously, the broadcasting of the same program in an NTSC-compatible (525 line) and higher definition (1050-line) format from a common transmitting site and on the same 6 MHz spectrum channel allotment.[7] In contrast to what is presently being contemplated by the Commission, the FIT system does not require a separate 6 MHz ATV channel from another portion of the VHF/UHF television spectrum for purposes of simulcasting. Existing broadcast television channel assignments and

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[6] Successive 36 MHz wide spectrum channels are spaced only 20 MHz apart from one another so that the channels overlap or share common frequency spectrum. Odd-numbered channels are vertically polarized, and even-numbered channels are horizontally polarized. Interference is eliminated by assigning mutually orthogonal polarizations to the overlapping channels. "The vertical and horizontal polarizations, much like polarized sunglasses, allow only signals polarized in the same sense to be received, and if there are two polarization senses, twice as many signals can be sent." J.E. Traister, supra, at 4 (emphasis added).

[7] In the NTSC-compatible configuration, a 1050-line high definition image produced at the studio is translated into two 525-line image frames. One frame is composed of all the odd-numbered lines of the original image and the other frame is composed of all the even-numbered lines. The two frames are then transmitted without compression in a conventional NTSC 2-field interlaced format using separate transmitters operating at the same video carrier frequency, and are radiated from orthogonally polarized antennas, one horizontal and the other vertical. Conventional NTSC receivers will reproduce 525-line images using their existing antennas. The proposed ATV receiver simply uses a dual polarization antenna, and has appropriate circuitry to interleave the simultaneously received 1050-line images in the proper sequence on a high definition display screen.

availability would simply not be affected.

II. The Advisory Committee Process is Not Informing the Commission of All Viable Options for ATV

6. The FIT system was submitted for consideration by FIT's predecessor to the Advisory Committee on Advanced Television Systems (the Advisory Committee). By letter dated December 21, 1989 (Exhibit A), the Chairman acknowledged receipt of the proposal, stating:

> "The design described in your submission is unique among all known proponent systems in that it uses two multiplexed, orthogonal plane waves operating on the same frequency. . . . The approach is intriguing."

Exhibit A, page 2.

7. Nevertheless, the Advisory Committee stated that no testing slots were available. Furthermore, because of the unique approach taken by the proposed FIT system, the Advisory Committee stated that its testing facility was not capable of evaluating the system even if a testing slot later became available.

8. An obligation of the Advisory Committee under its Charter is to "advise the Federal Communications Commission on the facts and circumstances regarding advanced television systems for Commission consideration of the technical and public policy issues" (Exhibit B, page 1). This notwithstanding, the FIT system proposal was totally excluded from the Third Interim

Report of the FCC Advisory Committee on Advanced Television Service dated March 21, 1990. Thus, the Commission apparently was not apprised of the existence of what the Advisory Committee Chairman characterized as a unique and intriguing ATV system, which is capable of providing twice the line resolution of the existing NTSC standard while at the same time remaining compatible with existing home (NTSC) TV receivers.

9. The FIT transmission system is a high definition terrestrial system. As such it meets the Commission's threshold criteria and deserves to be tested against the other candidate systems. The Advisory Committee's apparent bias toward cable transmission, as evidenced by the very nature of the Committee's test facility is, we submit, operating as an impediment to the Commission's thorough and complete evaluation of all possible alternatives. Accordingly, FIT requests that the Commission order over-the-air tests of its proposed system and that all attendant data gathering be conducted directly under the auspices of the Commission and through channels other than the Advisory Committee.

10. FCC Chairman Sikes recently observed that "[t]hinking tends to be shaped by precedent. If it hasn't happened before, people get uneasy. And, too often that uneasiness is translated into all sorts of reasons why something cannot -- or should not -- occur. . . . America's strength has

always been its entrepreneurs, the men and women who develop a concept and press forward to accomplish it."[8] FIT submits that the Commission should not let its own thinking be shaped in any one particular direction, e.g., digital or analog, until all system data is objectively evaluated by the Commission through its own experienced technical personnel and resources. The potential reward justifies the effort. If FIT's transmission system is fully proven, then no spectrum reallocation is necessary; then no present viewers are disenfranchised; then scarce spectrum can be applied to other uses rather than to a duplicate broadcast system. These potential benefits are so great that the Commission can not ignore them and still hope to meet its public interest obligations.

III. Compatibility of any ATV System With Existing Home TV Receivers is Required by Law

11. Compatibility of a proponent's system not only with cable but with all kinds of electronic devices is being stressed in the present proceeding. Order/FNPRM, ¶¶ 70-76. But what about compatibility with the one video electronic device found in almost every household in the United States - the NTSC television receiver! FIT submits that public policy and statute dictate the requirement for compatibility of any newly adopted broadcast television standard with the millions of existing

[8] Remarks of FCC Chairman Alfred C. Sikes before the National Technological University (May 28, 1992), at page 1.

television receivers now owned by the American viewing public.

12. First, as a matter of American broadcasting history, compatibility with then-existing transmission signal formats was a critical factor in the successful implementation of color television and stereophonic FM multiplex standards here. Broadcast viewers and listeners are accustomed to compatibility with respect to new transmission signal formats whether it be in the television or radio broadcasting service. Moreover, enhancement, rather than replacement, is the best way to maximize the chances of public acceptance of this new development. Broadcasters, who ultimately must take the greatest financial risks to implement this technology, should be provided with a product that accomplishes a transition to advanced television rather than a system that completely scraps the installed base of home television receivers.

13. Second, there is a Congressional mandate for compatibility in the television broadcasting realm as expressed by the All-Channel Receiver Act, 47 U.S.C. § 303(s). The statute authorizes the Commission to "require that apparatus designed to receive television pictures broadcast simultaneously with sound be capable of adequately receiving all frequencies allocated by the Commission to television broadcasting" (emphasis added). The mandate is echoed by the Commission's own rules at 47 C.F.R. § 15.117. The purpose of the statute and rule was to remedy a

situation in which the bulk of home television receivers were only capable of receiving VHF spectrum broadcasting, and the number of potential viewers of programming that could be delivered via the UHF spectrum was being limited. As stated in the legislative history, the statute was enacted so as to place in the hands of consumers television receivers that "are capable of receiving all of the channels allocated for television use in both the UHF and VHF portions of the spectrum."[9] This is still the public policy as well as the law of the United States.

14. Having taken steps to ensure that there now exists a proliferation of TV receivers in the United States capable of receiving all that television broadcasters may deliver via the VHF and UHF channel allotments, the creation of a separate incompatible ATV band within those same allotments would violate the letter and spirit of the statute. Congress sought to ensure that consumers will have television receivers capable of receiving all VHF/UHF channels. The FIT system provides a way to create ATV without denying programming to a single consumer. This is an enormously important consideration and one that only the FIT system satisfies among the present proponents. Yet in the rush to digital systems, which may actually be inferior, the Commission seems to be losing sight of the rights of viewers and listeners whose rights must always be considered paramount. Red

[9] Senate Report No. 1526, U.S. Cong. & Adm. News (1962), at 1873, 1876 (emphasis added).

Lion Broadcasting v. FCC, 395 U.S. 367,390 (1969).

IV. The American Viewing Public Should be Given a Voice

15. In its Comments filed December 20, 1991, FIT stated that American consumers should be afforded an opportunity to see and comment on the picture quality of all proposed ATV systems when broadcast over the air within a 6 MHz spectrum channel, prior to Commission adoption of a new transmission standard. The EIA/ATV Committee replied that the Commission "cannot reasonably be expected to wait" for such typical viewer commentary.[10]

16. FIT certainly does not advocate delaying the process; however, before the Commission expends much more of its staff resources; before broadcasters are asked to sign commitments for orders; before manufacturers design assembly lines; the Commission ought to have a reasonable basis for believing that there is a market for HDTV. A recent published report of a demonstration of HDTV at a Berlin trade show stated that viewers could not tell the difference between a HDTV picture and a NTSC picture broadcast with a 16:9 aspect ratio.[11] It would be the greatest regulatory fiasco in history if the entire ATV industry were created at a cost of untold billions only to

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[10] Reply Comments at 17.

[11] W5YI Report, June 1, 1992, at page 10.

come to the same result.

V. Conclusion

17. Due consideration by the Commission of the FIT transmission system and all other matters raised herein is respectfully requested.

WILEY, REIN & FIELDING

1776 K STREET, N.W.
WASHINGTON, D. C. 20006
(202) 429-7000

RICHARD E. WILEY
(202) 429-7010

FACSIMILE
(202) 429-7049
TELEX 248349 WYRN UR

December 21, 1989

Leo Zucker, Esquire
Attorney at Law
50 Main Street
Eighth Floor
White Plains, NY 10606

Dear Mr. Zucker,

I am in receipt of the description of an HDTV Broadcast System proposed by Carole Broadcasting Technologies, Inc. that you submitted.

Testing of advanced television transmission systems will be conducted under the auspices of the Advisory Committee, through the facilities of the Advanced Television Test Center and the Cable Television Labs. The number of systems actually tested will depend upon the resources available, the time schedule established by the FCC, and the number of systems certified by the Advisory Committee as suitable for testing. As Mr. Felker of my office explained to you, all available test slots have been reserved since last September. Therefore, I am unable at this juncture to say when, or if, any newly proposed system could be scheduled for testing.

However, it is the Advisory Committee's desire to consider all viable system proposals fully within the limits of available resources and consistent with the wishes of the FCC. It is possible that because of changes in proponents' plans, slots which are presently reserved will become available. If so, such availabilities could be used to test systems which had not been scheduled previously.

Over the next several months, the Advisory Committee will begin to consider the procedures it would use in allocating newly available testing slots. Although it is too early to say even generally what criteria will be used to assign whatever slots may become available, it is clear that only systems that ATTC/Cable Labs are physically capable of

EXHIBIT A

testing will be assigned a slot. In this regard, the Carole system presents a serious problem.

The design described in your submission is unique among all known proponent systems in that it uses two multiplexed, orthogonal plane waves operating on the same frequency. Because crosstalk between the cross-polarized signals would appear to be a parameter which limits the detected image quality, an accurate assessment of this design can only be done with an actual over-the-air test configuration. Unfortunately, the ATTC/Cable Labs test beds have not been designed to perform all tests using an off-the-air channel. Therefore, even if slots which are presently reserved should become available, the ATTC/Cable Labs, as presently configured, would not be able to test the system proposed by Carole Broadcasting.

Moreover, on the basis of an admittedly quick review, it appears as if the Carole system design might also encounter some practical problems in a real world environment. As I understand it, the Carole proposal envisions that upwards of 20 dB discrimination between the two waves can be achieved and will be sufficient to preclude crosstalk. The approach is intriguing. But, I would urge you and your client to consult with engineers with practical experience with depolarization of propagated TV signals to confirm that sufficient polarization discrimation would actually exist in the real world. While the CCIR Radio Regulations specify 18 dB polarization for planning purposes, I have been advised informally that it is not uncommon to experience values as small as 6 dB. If this is correct, the system may not perform as expected.

Despite the reservations expressed above, I have forwarded your submission to Dr. Irwin Dorros, Chairman of the Systems Subcommittee, Advisory Committee on Advanced Television Systems, for review by his ATS Systems Analysis Working Party. A final decision regarding testing of the Carole system must await the review by that group, as well as the recovery of testing slots, and the development of slot assignment criteria. In the meantime, it would probably be in your client's best interest to involve himself as much as possible in the workings of the Advisory Committee. For your information, I am enclosing a copy of the Committee's roster, organizational chart, and charter.

Thank you for your interest in this most important endeavor.

Sincerely,

Richard E. Wiley

Richard E. Wiley
Chairman
Advisory Committee on
Advanced Television Systems

Enclosures

cc: Dr. Irwin Dorros

As amended 5/9/88

CHARTER FOR
ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE

A. The Committee's Official Designation.

Advisory Committee on Advanced Television Service

The Advisory Committee will have no more than twenty-five members and will function as a Parent Committee. These members will be chosen by the Commission so as to obtain diverse and representative viewpoints, including but not limited to those of television broadcast networks and stations, equipment manufacturers, cable television interests, and the communications bar. The Advisory Committee Chairman will direct the activities of the Committee and Subcommittees and will communicate regularly with the Chairman of the Federal Communications Commission.

The Chairman may establish a Steering Committee composed of the Subcommittee Chairmen and their Vice Chairmen. The purpose of the Steering Committee will be to help the Chairman manage the inter-related activities of the Subcommittees and to oversee various administrative functions of the Advisory Committee.

B. Name of Subcommittee(s).

Three Subcommittees:
Planning Subcommittee, Systems Subcommittee, Implementation Subcommittee

Membership of Subcommittees will be open to all interested parties.

C. Committee's Objectives and Scope of its Activity.

Parent Committee

Objective: The Committee will advise the Federal Communications Commission on the facts and circumstances regarding advanced television systems for Commission consideration of the technical and public policy issues. In the event that the Commission decides that adoption of some form of advanced broadcast television is in the public interest, the Committee would also recommend policies, standards and regulations that would facilitate the orderly and timely introduction of advanced television services in the United States.

Scope of Activity: All steps necessary to assemble information, analyze information, deliberate upon appropriate policies and actions, and develop recommendations regarding the introduction of terrestrial advanced television service. Includes technical, economic, legal and regulatory issues.

EXHIBIT B

Planning Subcommittee

Objective: To plan the attributes of advanced television service in the United States.

Scope of Activity: All steps necessary to provide advice on desired features of terrestrial advanced television service.

(a) Define the desirable characteristics of advanced television service; for example, in terms such as picture quality, population served, costs to broadcasters/consumers/manufacturers, relationship to existing broadcast service, relationship to non-broadcast services.

(b) Review the technical planning factors for the existing television service and recommend planning factors for advanced television service, including consideration of factors such as coverage area, quality of service, frequency reuse criteria, receiver quality, spectrum allocations.

Systems Subcommittee

Objective: To specify the transmission/reception facilities appropriate for providing advanced television service in the United States.

Scope of Activity: All steps necessary to provide advice on the parameters of systems to provide terrestrial advanced television service.

(a) Evaluate, on technical and economic bases, advanced television systems now under development for the purpose of determining feasibility for implementation in the United States.

(b) Recommend advanced television system(s) now under development as candidate(s) for implementation, or specify the design of an appropriate system.

(c) Advise on the appropriate transmission/reception technical standards and spectrum requirements for the recommended system(s).

Implementation Subcommittee

Objective: To establish a scheme for implementation of advanced television service in the United States.

Scope of Activity: All steps necessary to provide advice on policies, regulations and standards for implementation of terrestrial advanced television service.

(a) Develop a transition scheme for implementation of advanced television service in the United States.

(b) Recommend appropriate FCC policies and regulations to oversee implementation of advanced television service and develop guidelines for industry activities.

D. Period of Time Necessary for the Committee to Carry out its Purposes.

An initial written report containing recommendations of the Committee on fundamental parameters and spectrum requirements shall be submitted by 6 months from the date of the first meeting unless the Chairman of the Advisory Committee, in consultation with the Chairman of the Federal Communications Commission, determines that a different date is appropriate.

E. Official to Whom the Committee Reports.

The Chairman of the Federal Communications Commission.

F. Agency Responsible for Providing Necessary Support for the Committee.

The Federal Communications Commission will furnish necessary administrative support, including facilities needed for conducting meetings of the Committee.

G. Description of Duties for Which the Committee is Responsible.

The duties of the Committee and its Subcommittees will be to assemble information, to conduct deliberations and to prepare and submit recommendations appropriate to the attainment of the objectives listed under (C) above.

H. Estimated Annual Operating Costs in Dollars and Person Years.

The estimated operating costs are $10,000 for the FCC. Estimated person-years are 3.0 for the FCC and 25.0 for non-government participants.

I. Estimated Number and Frequency of Committee Meetings.

The Committee will meet three times per year or at such intervals as the Committee decides. Subcommittees are expected to meet on a monthly basis until completion of their tasks.

J. Committee's Termination date.

The Committee will terminate September 30, 1989.